

based on only the nearby relationship data, obtaining layout data identifying the subject element's position in the space with negative curvature.

Remarks

The above Amendments and these Remarks are in reply to the Office Action mailed 12-August-2002. No fee is due for the addition of any new claims. A Request for Extension of Time to Respond is included herewith, together with the appropriate fee.

Claims 1-28 were pending in the Application prior to the outstanding Office Action. In the Office Action, the Examiner rejected all pending claims. The present Response cancels claim 16 and replaces claims 1, 13, 14, 15, 19, 21 and 24, leaving for the Examiner's present consideration claims 1-15 and 17-28. Reconsideration of the rejections is requested.

I. ART REJECTION

The Examiner rejected all claims under 35 U.S.C. 102(b) as being anticipated by Lamping et. al. U.S. Patent No. 5,619,632. Applicants will discuss the rejections in claim number sequence.

A. INDEPENDENT CLAIM 1

Applicants' claim 1 calls for, among other things, a step of:

based on the nearby relationship data, obtaining layout data
indicating the element's position relative to a parent in the space
with negative curvature.... (emphasis added)

In the office action, the Examiner continues to argue that Lamping '632 teaches this limitation.

Lamping '632 teaches obtaining layout data indicating the element's *position* in the space with negative curvature, but he never teaches that such position information should be obtained *relative to a parent*."

There is a significant difference between *relative* positions and *absolute* positions. The *absolute* position of a particular node might be, for example, $(x,y)=(15,32)$. That is, if the layout space has an x-y coordinate system, the particular node is positioned at $x=15$ and $y=32$. Position information expressed as an *absolute* position does not make reference to any other node. It stands by itself.

The *relative* position of a node makes reference to at least one other node, such as a parent node. For example, the *relative* position of the particular node might be expressed as $(r,\theta)=(5,15 \text{ degrees})$, relative to parent node. That is, the particular node is positioned at a distance 5 from the parent node, along a vector that differs by 15 degrees from the angle of the vector incoming to the parent node.

Lamping '632 does not teach obtaining layout data indicating an element's position relative to a parent in the space with negative curvature. Specifically, Lamping '632 teaches that his CPU "uses node-link data 240 defining a node-link structure to obtain layout data 242, indicating *positions* for parts of the node-link structure in a layout space...." Lamping '632, Col. 16, lines 55-58. He does *not* teach that the positions are *relative* positions in the layout space. As stated in Applicants' Response B, they could equally well be *absolute* positions in the layout space. In fact, upon detailed study of Lamping '632, together with Lamping '250 referenced in

Lamping '632, it becomes apparent that Lamping's '632 process for obtaining layout data obtains the elements' positions only in *absolute* terms, not "relative to a parent".

Lamping '632 discusses his method of using node-link data to obtain layout data, primarily in his Fig. 9 and at his col. 20, line 18 through col. 21, line 8. According to this description, the layout routine is called with the handle of a root node in the node-link data, with coordinates of the position at which the root node should be laid out in the hyperbolic plane, with a wedge of the hyperbolic plane, and with a room bound. The wedge is defined by a wedge angle (an angular width in the hyperbolic plane, originating at the root node position) and a direction (relative to some predefined fixed direction in the hyperbolic plane). The room bound indicates the radius of a circle centered at the root node position. Roughly described, the routine will lay out the root node and its children all within a region of the hyperbolic plane that is bounded by both the specified wedge and room bound.

Applicants note here that in this routine, both the position at which the root node should be laid out in the hyperbolic plane, and the wedge within which its children should be laid out, are all given in absolute terms. None of this information is provided "relative to a parent" in the hyperbolic plane.

The routine operates recursively, by calculating the position in the hyperbolic plane for each immediate child node, and a wedge and a room bound within which that child's further children should be laid out in the hyperbolic plane. Again, however, both the position and the wedge for the child node are all given in absolute terms. None of this information is provided "relative to a parent" in the hyperbolic plane.

Part of the calculation of the position at which a child node should be laid out in the hyperbolic plane, involves calculating the distance to the children (Lamping '632 step 354). It may be that the Examiner considers this step to satisfy the step in Applicants' claim 1, calling for obtaining an element's position "relative to a parent" in the space with negative curvature. But at most this step of Lamping '632 defines only the *distance* between the child node and the parent node. It does not define the element's *position* relative to the parent node, because the child could still be anywhere on a circle surrounding the parent node. In order for such *distance* to be used for establishing the element's position, some other coordinate (such as *angle* information) would be required as well. Nothing in Lamping '632 says that a second coordinate of the child node's position is specified in any manner that is relative to a characteristic of the parent node.

Lamping '632 refers to Lamping U.S. Patent No. 5,590,250 (the "Layout Application"), which is incorporated by reference into both Lamping '632 and the present application, to describe in more detail how the child node's position is determined. In Lamping '250, the layout process is described primarily with respect to Figs. 9 and 10 and the text at col. 21, line 33 - col. 24, line 46. The process for obtaining each child node's position is described in detail there, and it can be seen that the second coordinate used is *angle* information, and the *angle* of each child node's position is obtained only in *absolute*, not *relative* terms. In particular, in the embodiment described in Lamping '250, the angles are specified relative to the "rightward" direction: "the zero direction from which other directions are measured." (Lamping '250, col. 23, lines 64-65). That is an *absolute* direction, not a direction *relative to a parent*.

Thus it is abundantly clear that Lamping '632 does not in any way teach Applicants' step of obtaining layout data indicating an element's position *relative to a parent* in the space with

negative curvature. The positions of the nodes are obtained during the layout process of Lamping '632 only in *absolute* terms, not *relative to a parent*. At most the process includes an intermediate step of obtaining the *distance* of a child node from a parent node, but that only puts the child node somewhere on a circle surrounding the parent node. It is not enough to establish the child node's *position* relative to the parent node. The *positions* of child nodes in Lamping '632 are obtained only in *absolute* terms, not *relative* to a parent node.

The difference between obtaining layout data indicating the element's position *relative* to a parent and obtaining layout data indicating the element's position in *absolute* terms may seem in hindsight to be a small difference, but in fact the difference is extremely significant. As pointed out in Applicants' specification, for example at pp. 5-7, the representation of layout data indicating positions *relative to a parent* provides a number of important advantages.

For example, by representing the layout data *relative to a parent* it is now possible to change the position of an element *and all its descendants* merely by making a single change or a small constant number of localized changes in the data structure.

The technique also simplifies applications in which it is desirable to lay out only part of a node-link structure, such as in a dynamic structure when a node is added or deleted, or in a static structure that can only be laid out and displayed in fragments because not all of the structure is available in memory.

The technique also facilitates laying out a tree that is a partial representation of a directed graph in which nodes have multiple in-links: a shared branch of such a tree need only be completely laid out once for all of its occurrences, since only the *relative* position of the uppermost elements will differ between occurrences.

The technique also facilitates animation of a change involving only part of a structure, since the transition can now be animated easily and efficiently in a way that only changes positions of elements that are near the insertion or deletion.

Still another advantage of the technique is that a display can be generated starting at any arbitrary element, rather than always starting at the root node or at the bottom leaves of a structure as in conventional techniques.

Still further, element positions indicated *relative* to a parent can almost always be expressed with adequate precision. In contrast, if an element's *absolute* position in a hyperbolic plane is used, a large structure could exhaust the available floating point numbers.

The Examiner appears to argue in his Response to Arguments that Lamping '632 teaches Applicants' step of "obtaining layout data indicating the element's position *relative* to a parent", by teaching a node-link data structure in which (1) *relationships* between parent and child elements are maintained, and (2) each node has an *absolute* position in the layout space. The Examiner's position appears to be that since these two items of information are *sufficient* to obtain relative layout data, the reference essentially *teaches* the step of obtaining the relative layout data.

But having the *basis* on which to obtain the element's position relative to a parent is not at all the same thing as actually *obtaining* the element's position relative to the parent. Prohibited hindsight reconstruction is required to make the leap taken by the Examiner. Lamping '632 does not teach any step of actually *obtaining* the element's position relative to a parent, and in fact can

accomplish all the functions described in Lamping '632 by using only the *absolute* position of the elements in layout space -- though less efficiently than with Applicants' present invention.¹

Applicants' claim 1 calls for the affirmative step of *obtaining* layout data indicating the element's position *relative* to the parent. Lamping '632 simply does not teach that step, and therefore cannot anticipate Applicants' claim. **If the Examiner persists in his rejection, Applicants respectfully request the Examiner to point out where Lamping '632 teaches the affirmative step of *obtaining* layout data indicating the element's position *relative* to the parent.** Otherwise, the Examiner has not made *prima facie* case that claim 1 is anticipated.

B. Dependent Claims 2-12

Claims 2-12 all depend ultimately from independent claim 1, and therefore should be patentable for at least the same reasons as claim 1. In addition, each of these claims add limitations which, it is submitted, render them patentable in their own right.

For example, without limitation, **claim 3** adds a limitation that the layout data include:

position displacement data indicating a distance between the parent's position and the element's position,

and

and angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link from the parent to the element.

Nowhere does Lamping '632 teach such features. At a minimum, as described above with respect to claim 1, the layout data in Lamping '632 specifies *angle* information only relative to a

¹ Applicants' discussion in this paper concerns the *teachings* of the earlier Lamping patents. No statement made herein should be considered as commenting on the scope of any *claims* of the earlier Lamping patents.

predetermined and fixed "zero direction". Lamping '250, col. 23, lines 64-65, referenced in Lamping '632. He certainly neither teaches nor suggests representing layout data using "angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link from the parent to the element" as called for in Applicants' claim 3. The angles of incoming and outgoing links for parent nodes are not even mentioned in Lamping '632!

Claim 4 depends from claim 3 and adds the further limitation that the layout data include *only* the position displacement data and the angle displacement data. Again, Lamping '632 does not teach this limitation. Nor does the Examiner's office action make any attempt to identify it.

Claim 5 calls for the step of obtaining nearby relationship data to include a step of obtaining a count of grandchildren for each of a set of children of the parent. Nothing in Lamping '632 or Lamping '250 teaches this feature. Nor does the Examiner in the office action make any attempt to identify it, except to point to his rejection of claim 1, which makes no mention of this feature.

Claim 6 depends from claim 5 and adds limitations that the counts of grandchildren be used to obtain radii and angles, and that position displacement and angle displacement between the parent and the element be obtained using the radii and angles. Again, Lamping '632 neither teaches nor suggests this feature.

The Examiner cites Lamping '632 col. 23-24 and Fig. 13 as teaching these features, but that part of Lamping '632 is describing a process of *mapping* the information about the node-link structure *from* layout space to two-dimensional display space, which is *not a space with negative curvature*. Thus the method identified here by the Examiner is not a method of laying out a node-link structure in a space with negative curvature, as called for in Applicants' claim 1. For this

reason alone, the cited teaching is not relevant to Applicants' claim 1. In addition, it does not teach the limitations of claim 6.

Claim 7 depends from claim 6 and adds a limitation calling for a comparison to be made between the obtained angle displacement and the previous angle displacement to determine whether to lay out children of the element. Again, Lamping '632 nowhere teaches this element, and the part of Lamping '632 cited by the Examiner is not a method of laying out a node-link structure in a space with negative curvature.

Claim 8 depends from claim 1 and adds a limitation calling for the nearby node-link relationships, based on which the element's position relative to a parent in the space with negative curvature is to be obtained, include *only* relationships among the parent and the parent's children and grandchildren. The nearby node-link relationships therefore do not include any ancestors of the element's parent element. Not only is this feature not taught in Lamping '632, but it is *contrary* to Lamping '632, in which the node-link structure is taught as being laid out beginning at the *root* node. Nor do the parts of Lamping '632 identified by the Examiner teach the claimed features.

Accordingly, it is respectfully submitted that each of the dependent claims 2-12 should be patentable since the Examiner has not made a prima facie case of unpatentability.

C. Independent Claims 13-15

Claims 13-15 are independent claims all containing limitations similar to those in independent claim 1. These claims should all be patentable for many of the same reasons as set forth above with respect to claim 1. These claims also add their own limitations which, it is

submitted, render them patentable in their own right. It is respectfully submitted that these claims should be patentable because the Examiner has not made a prima facie case of unpatentability.

D. INDEPENDENT CLAIM 17

Independent claim 17 calls for a method of laying out a node-link structure in a space with negative curvature including:

obtaining nearby relationship data for a subject element in the structure, the nearby relationship data indicating information about nearby node-link relationships, the nearby relationship data excluding relationships with at least one element of the node-link structure; and

based on only the nearby relationship data, obtaining layout data identifying the subject element's position in the space with negative curvature.

This claim, among other things, emphasizes the ability of the methods described in the subject patent application to lay out only *parts* of the node-link structure in layout space, *without having to lay out the full tree, every time*. This claim does not require that layout data be maintained only relative to a parent, because there may be other ways of accomplishing the claimed technique. But the claim does require that the step of obtaining layout data identifying a subject element's position in layout space be based on *only certain relationship data* that excludes relationships with at least one element of the node-link structure.

The Examiner has once again cited Lamping '632 as teaching the limitations of claim 17. Lamping '632, however, teaches layout methods that start with the root node. The Examiner has not cited anything in Lamping '632 that teaches a step of obtaining layout data identifying a subject element's position in layout space be based on *only certain relationship data* that

excludes relationships with at least one element of the node-link structure. Applicants therefore submit that the Examiner has not made a *prima facie* case of unpatentability.

Accordingly, it is respectfully submitted that claim 17 should be patentable.

E. Dependent Claims 18-25

Claims 18-25 all depend ultimately from independent claim 17, and therefore should be patentable for at least the same reasons as claim 17. In addition, each of these claims add limitations which, it is submitted, render them patentable in their own right.

For example, without limitation, **claim 19** adds a limitation that the layout data include position displacement data indicating a distance between the parent's position and the subject element's position and angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link from the parent to the subject element.

As explained above with respect to claim 3, nowhere does Lamping '632 teach such features. At a minimum, the layout data in Lamping '632 specifies *angle* information only relative to a predetermined and fixed "zero direction". He does not teach representing layout data using "angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link from the parent to the subject element" as called for in Applicants' claim 19.

Claim 20 depends from claim 19 and adds the further limitation that the layout data include *only* the position displacement data and the angle displacement data. Again, Lamping '632 does not teach this limitation.

Claim 21 calls for the step of obtaining nearby relationship data to include a step of obtaining a count of grandchildren for each of a set of children of the parent. Nothing in Lamping '632 teaches this feature and the Examiner has not made any attempt to identify it.

Claim 22 depends from claim 21 and adds limitations that the counts of grandchildren be used to obtain radii and angles, and that position displacement and angle displacement between the parent and the element be obtained using the radii and angles. Again, Lamping '632 neither teaches nor suggests this feature. The Examiner's citation to Lamping '632 col. 23-24 and Fig. 13 is inapposite since that part of Lamping '632 describes a process of *mapping* the information about the node-link structure *from* layout space to two-dimensional display space, which is *not a space with negative curvature*. The cited teachings therefore are not a method of laying out a node-link structure in a space with negative curvature.

Claim 23 depends from claim 22 and adds a limitation calling for a comparison to be made between the obtained angle displacement and the previous angle displacement to determine whether to lay out children of the element. Again, Lamping '632 nowhere teaches this element, and the part of Lamping '632 cited by the Examiner is not a method of laying out a node-link structure in a space with negative curvature.

Claim 24 depends from claim 17 and adds a limitation calling for the nearby node-link relationships, based on which the element's position relative to a parent in the space with negative curvature is to be obtained, include *only* relationships among the parent and the parent's children and grandchildren. Lamping '632 does not teach or suggest this feature.

Accordingly, it is respectfully submitted that each of the dependent claims 18-25 should be patentable since the Examiner has not made a prima facie case of unpatentability.

F. Independent Claims 26-28

Claims 26-28 are independent claims all containing limitations similar to those in independent claim 17. These claims should all be patentable for many of the same reasons as set forth above with respect to claim 17. These claims also add their own limitations which, it is submitted, render them patentable in their own right. It is respectfully submitted that these claims should be patentable because the Examiner has not made a prima facie case of unpatentability.

II. CONCLUSION

The amendments to the claims not mentioned above have been made to more particularly point out the invention and not in response to any action of the Examiner. In addition, all the points raised by Applicants in their prior responses are incorporated by reference and reiterated herein.

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-0869 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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ATTACHMENT UNDER RULE 1.121

1. (Amended) A method of laying out a node-link structure in a space with negative curvature; the method comprising:

obtaining nearby relationship data for an element in the structure; the nearby relationship data indicating information about nearby node-link relationships; and

based on the nearby relationship data, obtaining layout data indicating the element's position relative to a parent in the space with negative curvature, the step of obtaining layout data comprising the step of calculating the element's position relative to a parent in the space with negative curvature.

13. (Amended) A system comprising:

a processor for laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure: obtaining nearby relationship data for an element in the structure; the nearby relationship data indicating information about nearby node-link relationships; and

based on the nearby relationship data, obtaining layout data indicating the element's position relative to a parent in the space with negative curvature, the obtaining of layout data comprising calculating the element's position relative to a parent in the space with negative curvature.

14. (Amended) An article of manufacture for use in a system that includes: a storage medium access device; and

a processor connected for receiving data accessed on a storage medium by the storage medium access device; the article of manufacture comprising:

a storage medium; and

instruction data stored by the storage medium; the instruction data indicating instructions the processor can execute; the processor, in executing the instructions, laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure:

obtaining nearby relationship data for an element in the structure; the nearby relationship data indicating information about nearby node-link relationships; and

based on the nearby relationship data, obtaining layout data indicating the element's position relative to a parent in the space with negative curvature the obtaining of layout data comprising calculating the element's position relative to a parent in the space with negative curvature.

15: (Amended) A method of transferring data between first and second machines over a network, the second machine including memory and a processor connected for accessing the memory; the memory being for storing instruction data; the method comprising:

establishing a connection between the first and second machines over the network; and

operating the first and second machines to transfer instruction data from the first machine to the memory of the second machine; the instruction data indicating instructions the processor can execute; the processor, in executing the instructions, laying out a node-link structure in a space with negative curvature; the processor, in laying out the node-link structure:

obtaining nearby relationship data for an element in the structure; the nearby relationship data indicating information about nearby node-link relationships; and

based on the nearby relationship data, obtaining layout data indicating the element's position relative to a parent in the space with negative curvature, the step of obtaining layout data comprising the step of calculating the element's position relative to a parent in the space with negative curvature.

19. (Once Amended) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the subject element and the parent are nodes and in which the layout data include position displacement data indicating a distance between the parent's position and the subject element's position and angle displacement data indicating an angular difference between an incoming link to the parent and an outgoing link from the parent to the subject element.

21. (Once Amended) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the act of obtaining the nearby relationship data comprises:

for each of a set of children of the parent, obtaining a count of grandchildren; the subject element being one of the set of children.

24. (Once Amended) A method as in claim 17 wherein the subject element has a parent element in the node-link structure, and in which the nearby node-link relationships include only relationships among the parent and the parent's children and grandchildren.